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(51) International Patent Classification 5 : G06F 15/21, H04M 3/22 H04J 3/26	A1	(11) International Publication Number: **WO 93/03446** (43) International Publication Date: 18 February 1993 (18.02.93)

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(54) Title: AUTHORIZATION OF POINT-OF-SALE TRANSACTIONS OVER ISDN COMMUNICATION NETWORK USING ONLY D CHANNEL
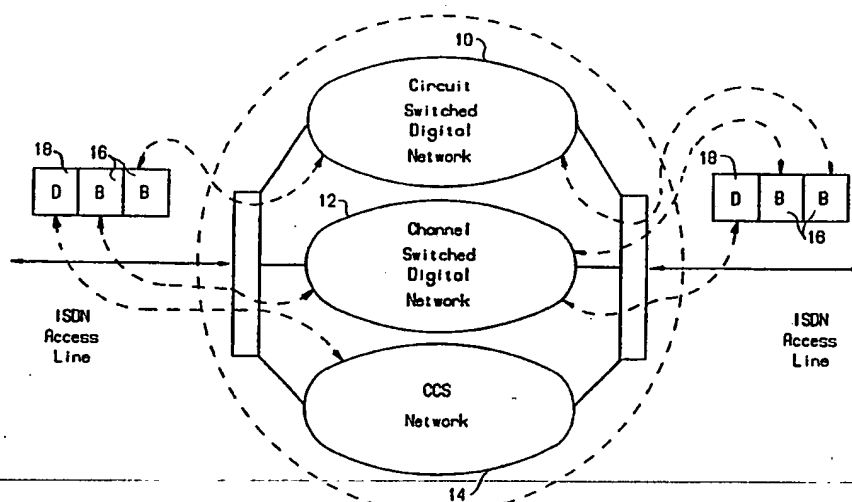
(57) Abstract

A communication system for exchanging information between a remote terminal (114) and a host terminal (112) over a signalling channel of an ISDN network (160) which does not need to establish communication over voice or data channels of the ISDN is disclosed. The communication system transmits credit transactions such as authorization requests from a remote terminal to a host computer, processes such transactions, and transmits a response back to the terminal, in which all such communication is performed over a signalling channel (18) of ISDN. Preferably, the authorization request as well as the response from the host includes a "user-user information element" and are formatted in accordance with the CCITT Q.931 standard. (fig. 2).

AUTHORIZATION OF POINT-OF-SALE TRANSACTIONS OVER ISDN COMMUNICATION NETWORK USING ONLY D CHANNEL

Cross-Reference to Related Applications

This application is related to application serial
no. 07/677,717, filed March 29, 1991, entitled "Interactive
5 Sequencing Method for ETC Systems", which is incorporated
herein by reference.

Field of the Invention

10   This invention relates generally to
telecommunication systems and, more specifically, to a
system for transmitting non-conventional data over a
signalling channel such as a D-channel of a Signalling
System Number 7 network which is typically part of an
15 Integrated Services Digital Network. A specific and
preferred embodiment of this invention relates to a method
for transmitting transactions such as authorization
requests in an electronic ticket capture (ETC) system
having a plurality of remote terminals and at least one
20 host computer, in which the remote terminals communicate
with and transmit such transactions to the host computer
over the ISDN network and, in particular, over the
signalling channel.

25 ### Background of the Invention

1.   Conventional ETC Systems

A wide variety of payment schemes may be employed
30 by the consumer to purchase goods or services.   For
example, a consumer may use credit cards, debit cards,
personal checks, cash, etc. In accepting any or all of the
non-cash forms of payment, it is important that the retail
establishment be assured that the credit which it extends
35 to the consumer is within the limits specified by the
financing service and that the consumer is current in

payments made to the financing service, or that the consumer's checking account and payment history are sufficient to warrant acceptance of a personal check. For these reasons, a variety of services have been established

5 which enable a retailer to perform some type of credit check in a non-cash transaction. Particularly in the case of credit cards, this may include the circulation of pamphlets or other listings indicating the account numbers of credit cards which are not to be honored for various

10 reasons, including poor credit risk and theft. However, such listings are generally cumbersome in use, and exhibit an inherent time lag between distribution of the pamphlets and their actual use which can result in the erroneous acceptance of a charge. Additionally, such pamphlets are

15 not readily applicable to the verification of personal checks.

As a result, a variety of automated systems have been developed which enable a retail merchant to

20 communicate with the company issuing the credit card (or its representative), or a company which will guarantee the personal check or otherwise extend credit, to obtain an immediate indication as to whether or not the credit card or check should be accepted or rejected. Such systems may

25 take the form of a clearing house which, in response to a conventional telephone call, provides verification against listings it maintains at the clearing house. More recently, such systems employing voice communications have been replaced with automated dial-up systems. Such systems

30 automatically read magnetic markings on the credit card or check and transmit data over the conventional voice telephone facilities to interrogate a database as to whether or not the credit card or check may be accepted. These systems are generally known as electronic ticket

35 capture (ETC) systems.

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A conventional ETC system employs a plurality of remote terminals which communicate over conventional telephone lines with at least one host computer. Such an ETC system is used to electronically process credit sales

5 and the like. Typically, such remote terminals are located at retail establishments and are referred to as point-of-sale (POS) terminals. These POS terminals provide the host computer with information relating to a variety of transactions such as sales, returns, authorizations,

10 deposit inquiries and voiding of a previously entered transaction.

Of particular interest to the present invention, an authorization transaction typically seeks approval from

15 the host computer for the extension of credit as in credit card sales. An authorization may be performed alone or in conjunction with other transactions such as sales. Transactions which require authorization from the host or which communicate with the host while the transaction is

20 performed, are referred to as on-line transactions. For example, transactions in which a consumer is given credit, e.g., those in which an amount is charged to an account, typically need to be authorized by the host; therefore, such transactions are generally performed on-line.

25 Transactions which may be performed at the remote terminal and which do not require interaction with the host when such transactions are performed, are referred to as off-line transactions.

30   Each on-line transaction typically involves a conventional telephone call to the host for approval at the time the consumer attempts the transaction. Since off-line transactions do not require communication with the host when the user attempts the transaction, the cost of the

35 telephone call associated with that transaction is saved. However, such off-line transactions eventually need to be

communicated to the host. Typically, these off-line transactions are transmitted to the host during end-of-day processing. End-of-day processing is a procedure in which the information related to off-line transactions is

5 transmitted to the host and checked for errors, errors are corrected to the extent possible, and databases are updated, etc. Of course, a telephone call is still required for transmitting off-line data, but the cost of such a call is less than the cost of making a call for each

10 off-line transaction. Such telephone calls are conventional in the sense that a communication link is established between the calling station (i.e., remote terminal) and the called station (i.e., host computer) as in a conventional station-to-station phone call when the

15 called station places its phone or modem in an off-hook state in response to the call from the calling station.

While they reduce the need for human intervention in the verification of credit transactions and decrease

20 delays in compiling and accessing a list of unacceptable account numbers, such automated systems are still subject to a number of drawbacks. Such drawbacks include the high cost of transmission, the need to establish conventional telephone calls, high data transmission errors, lengthy and

25 complex end-of-day processing, inadequate error detection and error recovery schemes, and limited capabilities of the POS terminals.

2. ISDN and SS7 Protocol and Architecture

30

Integrated Services Digital Network (ISDN) is being promoted by telephone companies in an effort to improve quality and capacity of telecommunications network and provide a variety of services. ISDN specifications

35 have already been introduced by the CCITT, the international communications standards committee. In th

U.S. and Canada, subsets and minor variations of these
standards are being defined by the major central office
equipment vendors. ISDN is generally defined as a network
that provides end-to-end digital connectivity to support a
5 wide range of telecommunication services, including voice
and non-voice services, to which users have access by a
limited set of standard customer interfaces.

The technical concept of ISDN is implemented by
10 using the existing telephone lines to carry a digital
signal instead of the conventional analog voice signal. In
one embodiment referred to as the basic rate interface
(BRI), the digital information is transmitted over three
multiplexed channels. In this illustrative embodiment, two
15 64 kilobits per second (kbps) bearer channels (referred to
as "B" channels) are provided for voice or data calls, and
one 16 kbps signalling channel (referred to as the "D"
channel) is provided for exchanging control information
between user and network. Another embodiment, referred to
20 as the primary rate interface (PRI), employs twenty-three B
channels and one D channel. Implementation of ISDN
requires new central office switching and transmission
equipment, and sometimes dramatically different terminal
equipment (e.g., telephones, modems, data terminals) at the
25 user or subscriber end of the telephone line. At present,
ISDN is available in some cities in the U.S., and is widely
implemented in Europe.

As noted above, in basic (BRI) ISDN service, the
30 voice or data information is carried by one of the two B
channels of the ISDN. Call set-up transactions necessary
to make a connection, or link, are established via the
signalling channel. Messages sent to and from the central
office on the signalling channel contain the information
35 defining the status of the link and enable the call to be
set up on the B channel.

Fig. 1 schematically depicts an Integrated
Services Digital Network (ISDN), which illustratively
employs a common channel signalling network (CCS) such as
Signalling System 7 (SS7) for network control.

5 Specifically, the ISDN comprises a circuit-switched digital
network 10, a channel-switched digital network 12 and a
common channel signalling network 14. Illustratively, the
common channel signalling network 14 is a Signalling System
Number 7 (SS7) network. An ISDN station typically accesses

10 the digital transport facilities via either one of two 64
kbps bearer (B) channels 16. Access to the signalling
network occurs on, for example, a 16 kbps signalling (D)
channel 18. Alternatively, the D channel may be a 64 kbps
channel or any other channel suitable for the transmission

15 of call set-up information.

Each of the two B channels is conventionally used
to convey digitized voice samples at the rate of eight
thousand, eight-bit samples per second, or data at a rate

20 of 64 kbps. The D channel is used to convey signalling or
call set-up information in the form of signalling packets
which effect message signalling between ISDN stations.
Such message signalling includes signalling among various
network nodes which typically control or define path(s)

25 between two ISDN stations.

To establish communication between any two
stations in a network it is necessary to organize the
information being communicated in a form mutually

30 acceptable to all of the communicating entities. Such an
organization of information is referred to as a
communications protocol. Typically a communications
protocol is designed as a structured set of protocols which
form a hierarchy. Each protocol of the hierarchy is

35 referred to as a "layer" or "level", and each layer is
dedicated to a specific function or a set of functions.

SS7 uses a hierarchical protocol which comprises the
following protocols (or layers): message transfer part
(MTP), signalling connection control part (SCCP),
transaction capabilities applications part (TCAP) and ISDN
5 user part (ISDN UP).

The overall function of the MTP is to transfer
signalling messages between signalling points (SPs) of the
network in correct sequence and without message loss or
10 duplication. The MTP is subdivided into three layers: a
physical layer, a link layer, and a network layer. These
layers correspond to layers of the well-known open system
interconnection (OSI) standard and provide standardized
connectivity, signalling and message-routing functions.
15

The physical layer, also referred to as OSI layer
1, consists of requirements on physical connection, power
transfer, line transmission receive and send signals,
timing, framing, multiplexing, maintenance and performance.
20 In other words, this layer provides for transmission of
unstructured bit streams over physical medium. Each
signalling data link illustratively consists of two data
channels providing opposite directions of transmission.

25   The link or data link layer, also referred to as
OSI layer 2, provides the functions of message sequencing
and message delineation into frames, error detection and
correction through retransmission of error frames,
subdivision of the signalling channel into a multiplicity
30 of logical channels, and data layer link recovery.

The MTP signalling network layer, also referred to
as OSI layer 3, or more generally as a signalling layer,
provides the means to establish, maintain, and terminate
35 network connections at the ISDN user-network interface.
Such information is illustratively defined in terms of

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messages exchanged over a signalling channel such as,
illustratively, the D channel of basic and primary rate
interfaces. Layer 3 provides reconfiguration of the
signalling network during failures and controls traffic
5 during congestion periods. Layer 3 provides functions such
as traffic management, link management and route
management. This layer makes the utilization of underlying
resources such as data link connections transparent to the
higher layers of the protocol.

10

The messages associated with layer 3 protocol
control circuit-switched and/or packet-switched
connections. Layer 3 utilizes functions and services
provided by the data link layer (layer 2), including
15 establishment of data link connections, error-protected
transmission of data, notification of unrecoverable data
link errors, release of data link connections, notification
of data link layer failures, recovery from certain error
conditions, and indication of data link layer status.
20 These functions and services provided by layer 2 are
further defined in CCITT Recommendations Q.920 and Q.921.

Specific functions performed by layer 3 include
the following: processing of primitives for communicating
25 with the data link layer (a primitive specifies the
function to be performed and is used to pass data and
control information), administration of timers and logical
entities (e.g., call-references which are used to identify
the call or request at the local user-network interface)
30 used in call control procedures, administration of access
resources including B channels and packet-layer logical
channels, and checking to ensure that services provided ar
consistent with user requirements (e.g., compatibility,
addresses, service indicators). The following general
35 functions may also be performed by layer 3: routing and
relaying, network connections, network conn ction

multiplexing, segmenting (i.e., dividing a long message
into smaller messages) and blocking, error detection, error
recovery, sequencing, and flow control.

5   The Signalling Connection Control Part (SCCP)
protocol exists at a higher level or layer of the hierarchy
than MTP and enhances the functionality provided by MTP.
More specifically, the SCCP layer of the protocol is
responsible for logical signalling connections, routing and
10 management. The ISDN UP provides call-related services
which include interexchange (IXC) signalling to support
ISDN access signalling, circuit control and specialized
subscriber facilities such as calling party identification,
call status checking and trunk management. TCAP supports
15 non-circuit control applications such as service control
point (SCP) access for number translation and dial 800
services.

        Two separate series of CCITT Recommendations (the
20 I series and the Q series) define the D channel protocol.
In particular, the network layer (layer 3) of the D channel
protocol is defined in CCITT Recommendation I.451 or Q.931,
each of which is incorporated herein by reference. As
stated, this network layer provides call or connection
25 set-up, alerting, routing, and release of ISDN calls. The
data link layer (layer 2) is defined in CCITT
Recommendation I.441 or Q.921.

        In general, the Q.931 protocol is responsible for
30 call routing and control. The protocol defines various
messages that are transmitted between stations such as POS
terminals and the host computer by way of various elements
or nodes of the network. Further information regarding
Q.931 and I.451 may be found in "Data Communications
35 Standards", Edition III, McGraw-Hill, 1986, which is
incorporated herein by reference.

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Referring now to Fig. 2, there is depicted a
generic Q.931 message structure. As seen from Fig. 2, the
data is organized as a plurality of eight-bit bytes,
referred to as octets.

5

More specifically, octet 1 comprises a "protocol
discriminator" which indicates that the message which
follows is in accordance with the Q.931 standard. A
portion of octet 2 comprises a "length of call reference
10 value" which indicates the length of the message which
follows. Octet 3 is a "call reference value" which
identifies the call or facility at the user-network
interface to which a particular message applies. After the
"call reference value", a "message type" field is provided
15 to identify the type of message being sent.

The above elements are common to all Q.931
messages and must always be present, while the content of
the following octets are specific to each message type and
20 may include other mandatory and optional elements. These
other elements may be single octet information elements or
variable length information elements. The variable length
elements typically comprise an "information element
identifier" to indicate the information elements which
25 follow, as well as a "length of information element", which
indicates the number of octets in the following information
elements, and the contents of the information element.

Fig. 3 symbolically illustrates an SS7 connection,
30 or call set-up, sequence. As is well known, the telephone
network is organized hierarchically. The lowest level of
the network beyond a calling or called station is typically
referred to as an end-office (EO), and the next level of
the network hierarchy is typically referred to as an access
35 tandem (AT or AT office). The basic function of the AT
office is to provide interconnection for a group of EOs and

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to provide access to the other levels of network hierarchy such as interexchange carriers (IXCs) and/or local exchange carriers (LECs).

5   More specifically, Fig. 3 illustrates a typical sequence of messages which may be transmitted over the D channel in accordance with the Q.931 standard. This sequence illustrates the steps necessary for setting up a telephone connection between a calling and a called
10   station. The messages issued and received by the calling station are depicted on the left-hand side of Fig. 3 as 170; the messages issued and received by the called station are depicted on the right-hand side of Fig. 3 as 172. The messages generated by the SS7 network are depicted in the
15   center of Fig. 3 as 174.

          Traditionally, when a user places a telephone or modem associated with the calling station off-hook, the calling station sends a "set-up" message to indicate call
20   establishment. The specific fields required for this message and the messages mentioned hereafter are defined in the Q.931 protocol specifications. In response to the "set-up" message the system sends an acknowledgment (not shown) to the calling station and starts the information
25   exchange sequence. When all of the information, such as dialed digits, is collected at the calling station, the set-up message is sent to the called station directly if the stations are directly connected by a local exchange carrier.
30

          Alternatively, and as depicted in Fig. 3, the set-up message is sent to the called station through the SS7 network if the stations are connected by an interexchange carrier. In this case an initial address
35   message (IAM) is sent by the calling station to the called station after the caller completes dialing the number of

the called station. The IAM includes an originating point
code (OPC) identifying the calling station, a destination
point code (DPC) identifying the called station, and a
signalling link selection and circuit identification code
5 (CIC) which uniquely identifies the SS7-supported circuit
employed, as well as other information such as information
encoded as part of the set-up message. The IAM progresses
from switch to switch until it is routed to the called
station at which time the called station rings.
10

        In response, the called station then sends an
"alerting" message to, for example, the SS7 network. The
"alerting" message indicates that the called station
received the set-up message. This alerting message is
15 forwarded by the SS7 network as part of an "address
complete" message to the calling station to indicate the
reception of the appropriately addressed "set-up" message
by the called station. At this point a ring back signal
associated with the alerting message is returned to the
20 calling station to indicate that the called station is
ringing. When the called station answers, a "connect"
message is sent by the called station to the SS7 network
which forwards the connect message as part of an "answer"
message to the calling station to indicate call acceptance
25 by the called station. At this point, the B channel voice
circuit is established.

        When one of the connected parties hangs up, a
"disconnect" message (not shown in Fig. 3) is issued. This
30 message is an invitation to release the connection and to
free the network resources. The network resources,
previously used for the call which just ended, are then
available for the next call.

35

ISDN and SS7 have enabled the development of
useful features such as incoming calling line
identification, often referred to as "caller ID". Incoming
calling line identification displays the caller's number
5 for incoming calls to a called customer station. The
feature is implemented by transmitting the calling line
identification to the called customer station in a data
message. Such data message may be transmitted to an analog
station, for example, during a silent interval between
10 ringing periods.

Thus, it is known to display a calling party's
number at a called party's station prior to placing the
called party's phone off-hook. However, such communication
15 is severely limited in the nature of the information which
may be transmitted to the called party. Moreover, the
called party must still place his/her phone off-hook to
enable any meaningful communication. Additionally, known
systems are limited to one-way signalling communication of
20 information useful to a user such as a calling party's
number. That is, the called station is incapable of
sending equivalent information back to the calling station.

Summary of the Invention
25

This invention relates to a communication system
for exchanging information between a remote terminal and a
host terminal over a signalling channel of an ISDN network
without the need to establish communication over voice or
30 data channels of the ISDN. More specifically, this
invention relates to a communication system which transmits
credit transactions such as authorization requests from a
remote terminal to a host computer, processes such
transactions, and transmits a response back to the
35 terminal, in which all such communication is p rformed over
a signalling channel of ISDN.

One particular embodiment relates to a method of
exchanging information between a host computer and at least
one remote terminal comprising the steps of sending a first
message from the remote terminal to the host computer over
5 a signalling channel of an ISDN network, sending a second
message from the host computer to the terminal over the
signalling channel, and sending a third message from the
host computer to the terminal over the signalling channel.
In this embodiment, the first message contains data
10 representing an information element which contains encoded
information to be communicated to an application running on
the host computer, the second message is sent in response
to the first message, and the third message is sent in
response to the first message and typically includes a
15 disconnect message. Advantageously, the exchange of
messages between the host computer and the terminal is
accomplished without establishing communication over any
non-signalling channel provided by the ISDN network.

20   Preferably, such an embodiment includes the steps
of processing the information element communicated to the
host, and interacting with at least one database accessible
by the host to determine whether a transaction is to be
authorized. In this embodiment, the first and second
25 messages correspond respectively to "set-up" and "alerting"
messages in accordance with the Q.931 standard.

In one specific implementation, an authorization
request is encoded as the contents of an information
30 element of the first message and authorization information
such as an approval or denial or an authorization code is
encoded as the information element of the second or third
messages.

35

Another embodiment relates to a transaction
processing system comprising a host computer system, a
plurality of remote terminals, and a network for enabling
communication between the host computer and the terminals,
5 the network providing each of the terminals with a
plurality of multiplexed communication channels, at least
one of which channels is a signalling channel. The host
computer includes means for retrieving transaction data
from information transmitted to said host, and each of the
10 terminals includes means for generating a message to be
communicated to the host computer and means for
interpreting a message received from the host computer, the
message communicated to the host including the transaction
data.
15

Each of the terminals includes means to exchange
information with the computer by sending and receiving
messages over the signalling channel of the network without
utilizing other channels of the network. Each of the
20 messages includes a first portion for data required for
network communication by an appropriate protocol and a
second portion for data representing the information that
is exchanged between the host computer and the terminal.

25   Advantageously, the messages to be communicated to
the host computer and the messages received from the host
computer are transmitted over the ISDN network as part of a
user-user information element formatted according to the
Q.931 standard, and the exchange of information between the
30 host computer and each of the terminals is typically
accomplished solely over a signalling channel such as in
the D channel of the ISDN network.

_____

Another embodiment relates to a method for
35 transmitting a request related to a consumer transaction
from a merchant to a host computer and for processing the

request. This method comprises providing a terminal connected to the host via an ISDN network, inputting consumer data including account information identifying a consumer's account into a memory of the terminal, and
5 encoding an application message string, which includes the consumer data, in accordance with an application-oriented protocol, such that the message string can be interpreted by software running on the host. The communication message is formatted according to a communications protocol, which
10 communication message includes the application message string and data for controlling message transmission across the ISDN network from the terminal to the host. The communication message is then transmitted over a signalling channel of the ISDN network to the host.

15

Once the host receives the communication, i.e., request message, it is parsed so as to separate the application message string from the other data in the request message. The message string is then interpreted in
20 accordance with the application-oriented protocol so as to identify and process consumer data including consumer account information. Information related to the consumer is then retrieved from the database, a response message is generated on the basis of the retrieved information, and a
25 response communication message is sent over the signalling channel of the ISDN network.

The present invention also relates to an apparatus for performing any of the above methods.
30

Accordingly, a primary object of the present invention is to provide a new and improved telecommunication system.

35

Another object of the invention is to provide a
system for transmitting non-conventional data over a
signalling channel so as to reduce or eliminate the need to
establish communication over conventional voice or data
5 channels.

A further object of the invention is to provide an
interactive method for two-way communication between two
stations without requiring that a conventional telephone
10 call be established.

A still further object of the invention is to
provide a telecommunication system having enhanced
features.

15

Another object of the invention is to provide a
system for transmitting non-conventional data over a
signalling channel such as in a D-channel or a Signalling
System Number 7 network within the context of ISDN.

20

A further object of the invention is to provide a
system capable of two-way digital communication between
first and second ISDN stations, in which such communication
exists via D-channel(s) of a Signalling System Number 7
25 network.

Brief Description of the Drawings

These and other objects, features and advantages
30 of the present invention will become more readily apparent
from the following detailed description of the invention in
which:

Fig. 1 schematically depicts an integrated
35 services digital network (ISDN) which employs a common
channel signalling network;

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Fig. 2 depicts the message structure of data in accordance with the Q.931 standard layer 3 of an ISDN's D channel; and

5   Fig. 3 schematically depicts an illustrative exchange of Q.931 messages for traditional call set-up between calling and called equipment; and

Fig. 4 is a block diagram of an electronic ticket
10 capture (ETC) system implemented as a point-of-sale (POS) system; and

Fig. 5 schematically depicts the sequence of messages employed by the system of the present invention.
15

Detailed Description of the Drawings

The descriptions of ISDN, layer 3, Q.931, and SS7 presented in conjunction with Figs. 1-3 have been provided
20 as background information so as to enable one to gain an understanding of and appreciate the context within which the present invention preferably operates.

Further information concerning ISDN, Q.931, SS7
25 and suitable communications protocol may be found in, for example, "Digital Telephony", by John Bellamy, published by John Wiley & Sons, Inc., 1991, and Proceedings of the IEEE, February 1991, each of which is hereby incorporated by reference.
30

The presently preferred embodiment of the invention comprises a method and apparatus for exchanging information between a host computer and at least one remote terminal over a signalling channel of an ISDN network in
35 which messages are transmitted back and forth between the host and a terminal without establishing communication over

any non-signalling channel provided by the ISDN. In one
implementation, a remote terminal transmits a credit
authorization request to a host which then transmits to the
terminal an approval or denial as part of a disconnect
5 message.

        The presently preferred embodiment of the
invention will now be described in the context of an
electronic ticket capture (ETC) system in which an
10 authorization request is transmitted from a remote terminal
to a host computer. In particular, the authorization
request is transmitted as part of the information element
of Q.931 standard messages transmitted via the network's D
channel.

15

        More specifically, what will be referred to as a
"user-user information element" contains the "information
element identifier", the "length of information element",
and the contents of the information element.
20 Advantageously, in the presently preferred embodiment, such
a "user-user information element" contains non-conventional
data to be utilized by the calling and/or called stations.
Such stations employ application programs which utilize the
data within the "user-user information element". Such data
25 is transmitted over the D channel of the ISDN.
Accordingly, there is no need to establish communication
over the B channel since the non-conventional data which
would have conventionally been transmitted over the B
channel may be transmitted over the D channel as part of
30 the information element of the "user-user information
element".

        An illustrative ETC system is disclosed in the
above-identified application serial no. 07/677,717.
35 However, the invention described in that application can be
practiced without practicing the present invention.

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Referring now to Fig. 4, there is depicted a block diagram of an illustrative electronic ticket capture (ETC) system 100 implemented as a point-of-sale (POS) system. ETC system 100 comprises a central system or host computer
5 112 and a plurality of merchant locations or ISDN terminals 114, in this case four although there could be more or fewer than four. Each merchant location 114 includes at least one computer unit 116, such as a microprocessor, and associated peripherals which communicate over a bus 118
10 with, for example, a consumer data input device 120, a transaction data input device 122, a memory 124 and an input/output (I/O) device 126.

Consumer data input device 120 is located at the
15 point-of-sale to a consumer of merchandise or services from a selected merchant. Device 120 may be a keyboard into which a consumer manually enters identification data and the like. Illustratively, such data may include the consumer's account number, date of birth, and form of
20 payment, i.e., credit card type. Device 120 preferably includes a magnetic card reader adapted to read the magnetic stripe on a conventional plastic card as a consumer swipes the card through the card reader. In the latter event, the magnetic stripe could be encoded with the
25 consumer's account number, date of birth, and type of card. Where a plastic card is used, device 120 may also include a keyboard for entry of a personal identification number (PIN) for verifying that the card is being used by the appropriate individual at the point-of-sale by comparing
30 the PIN to a code stored in the magnetic stripe. While the plastic card may be a credit card such as an American Express (TM) card, or a debit card, etc. Device 120 also preferably includes a display which may be used to provide feedback, instructions, or the like to the consumer. While
35 the nature and capacity of the display depends on the

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specific implementation, a five line liquid crystal display
(LCD) capable of displaying thirty characters per line has
been found acceptable.

5   Transaction data input device 122 is also located
at the point-of-sale and typically comprises a keyboard or
the like by which the sales clerk, for example, would enter
the type of transaction and data relating thereto, such as
the dollar amount of the merchandise purchased by the
10 consumer. Device 122 may comprise a cash register. Device
120 and device 122 may share components and may be
integrated as a single unit.

         Consumer data input device 120 and/or transaction
15 data input device 122 preferably includes programmable
function keys as well as ISDN function keys. The
programmable function keys enable a consumer and/or a sales
clerk to customize the terminal for his/her own particular
purposes. The ISDN function keys enable a consumer and/or
20 a sales clerk to quickly access and implement various ISDN
functions.

         Such programmable function keys and ISDN function
keys also enable one to perform local and remote
25 diagnostics. Additionally, host 112 may perform
diagnostics of terminal 114 without any required
intervention by a user or clerk at the terminal. Also,
host 112 is capable of remotely downloading programming
information and the like to terminal 114 so as to
30 essentially reprogram the terminal to perform new functions
and provide a user with enhanced features and capabilities.

         The data entered through devices 120, 122 may be
35 stored in memory 124. Memory 124 stores all data relating
to on-line as well as off-line transactions at least until

such data is transmitted to host 112, reconciled, and correctable errors corrected. Such reconciliation or balancing of data is typically performed at the end of each day during a procedure referred to as end-of-day
5   processing. However, as disclosed in the above-referenced application, serial no. 07/677,717, such reconciliation and balancing may be performed throughout the day whenever information is transmitted to the host, thus effectively eliminating the requirement of conventional end-of-day
10 processing. Advantageously, the merchant may edit the transaction data in memory 124 to include, for example, a gratuity or tip, or to void certain transactions. If data sent to host 112 appears to contain errors, the host will request the corresponding data from memory 124, and, in the
15 event of a discrepancy, the data from memory will generally be regarded as correct. Memory 124 may also include merchant data along with software suitable to direct operation of computer 116.

20   Terminal 114 preferably includes an ISDN telephone which may be part of device 120 and/or device 122. Such a telephone is associated with a codec, modem or similar device operable under control of CPU 116 and is capable of voice as well as data transmission.
25

      As is well understood, computer 116 will function in accordance with the operating program stored in memory 124. To this end, computer 116 may verify that the PIN number matches a code on the card and that the user is
30 authorized to use that card. Alternatively, host 112 may perform such PIN verification. Computer 116 may also determine the charges associated with the transaction. Computer 116 transfers data to the host 112 through I/O device 126, ISDN access line(s) 130, and ISDN/SS7 network
35 160. Such data may include the consumer's account number and birth date, th merchant data, and data relating to the

transaction performed or requested. The information may be
transferred either by means of a multiplexing system, a
packet switching system, etc.

5   As will be appreciated, computer 116 may take on a
variety of forms and provide a variety of functions,
including simply controlling the passage of data entered at
devices 120, 122 to host 112. However, computer 116 is
preferably programmable and downloadable from the host.

10

         Central system 112 communicates with ISDN/SS7
network 160 by way of ISDN access line(s) 130 through its
own I/O device 140. I/O devices 126 and 140 may include,
for example, codecs. Data received by central system 112

15 through its I/O device 140 is provided to bus 142 which
permits communication between I/O device 140, memory 142,
various databases 144, 146, 148, 150, an automated clearing
house (ACH) window 152 and host computer 154 which may
include a microprocessor and associated peripherals.

20

         Each of databases 144, 146, 148, 150 as well as ACH
window 152 includes a plurality of consumer and merchant
accounts. Each consumer account generally includes a
unique account number, a balance, and a PIN or the birth

25 date of the consumer. In one embodiment, one or more
databases may include a list of account numbers which are
not to be honored. Similarly, each of the merchant
accounts generally includes at least a unique account
number, and a balance. As will be appreciated, databases

30 144, 146, 148, 150 as well as ACH window 152 are
illustrative; any number of a wide variety of databases and
services may be accessed. Illustratively, such databases
and ACH window 152 are accessed by the ISDN terminals over
the D channel of ISDN/SS7 network 160 and the interfaces

35 are compatible with the Q.931 standard.

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The data received at I/O device 140 is sorted by
computer 154 under control of an operation program stored
in memory 142. Specifically, such data includes
transaction data and data which identifies the database to
5 be accessed, as well as customer-specific data, such as
account number. For example, during nightly or end-of-day
processing, once the proper account is found, the balance
is credited or debited and the account updated as
appropriate. The received merchant data is similarly
10 employed to locate the appropriate merchant account. The
merchant's balance is then credited or debited and the
account updated appropriately.

Illustrative transactions which may be communicated
15 between the host and the remote terminal include the
following: close batch, authorization and ticket,
return/credit, ticket only, authorization only, void sale,
void return, void ticket only, and previous processing day
deposit inquiry. Of these, the close batch and the deposit
20 inquiry are typically requested only by the merchant.
Additional transactions or, more specifically,
communications, between the host and the remote terminal
include revision inquiries and responses thereto, and
polling and responses thereto. Inquiries are typically
25 performed on-line. An authorization of certain
transactions is also performed on-line by an operator
having sufficient authority. While some transactions are
described as being communicated between the host and the
remote terminal, it is to be understood that some
30 transactions such as an authorization also require
communication between the host and a selected database.

A close batch transaction is generally performed at
the end of a predetermined time period or after a
35 predetermined number of transactions have been processed.
Typically, a close batch is performed at the end of each

day to transmit to the host any remaining off-line
transactions which were not yet received by the host, and
to reconcile and balance transaction data in the terminal
with transaction data in the host. As will be appreciated,
5   by transmitting off-line transactions throughout the day to
the host, the time for the close batch to be performed at
the end of the day is significantly decreased. Moreover,
time required for detection and correction of errors is
also significantly reduced since any errors associated with
10 the off-line transactions transmitted throughout the day
would have been detected and corrected, to the extent
possible, when transmitted.

          Transactions related to a sale of goods, services
15 or the like typically require an authorization from the
host to be transmitted to the merchant location. For
example, in the event a consumer wishes to purchase a
relatively expensive item with an American Express (TM)
credit card, the host must first authorize the sale. The
20 host accesses the American Express (TM) database (144 in
Fig. 4) to determine whether to authorize the sale. This
transaction is typically performed on-line and requires a
call to the host.

25   A return/credit transaction relates to crediting a
consumer's account by an amount. For example, if a
consumer returns defective merchandise, his account would
be credited with his cost of the merchandise. Typically,
such transactions do not require authorization from the
30 host and may be performed off-line.

          A ticket only transaction relates to a sale which
does not typically require an authorization from the host.
For example, if a consumer purchases a relatively
35 inexpensive item with a credit card, it may be economically

feasible and worth a calculated risk to forego approval
from the host. Accordingly, this transaction may be
performed off-line, i.e., at the terminal.

5   An authorization only is a transaction in which a
consumer is approved to have a certain charge or hold
placed against his account without actually crediting a
merchant with any amount or charging the consumer. For
example, a credit card may be used to guarantee payment
10 such as when one rents merchandise, regardless of how
payment is eventually made. An authorization only
transaction is typically performed on-line and requires
communication with the host.

15   The following "void" transactions may be performed
off-line: a void sale transaction which voids a previously
entered authorization and ticket transaction; a void return
transaction which voids a previously entered return/credit
transaction; a void ticket only transaction which voids a
20 previously entered ticket only transaction.

           A previous processing day deposit inquiry
transaction is a request made to the host from the terminal
regarding the results of the previous day's close batch
25 transaction.   This transaction is typically performed on-
line. Other inquiry type transactions may also be
performed, such as an inquiry of an off-line transaction
not yet sent to the host; such a transaction could be
performed off-line.
30
           The above-described illustrative transactions, as
well as other transactions, are preferably initiated by
depressing an appropriate key on keyboard 120 or 122. For
example, to initiate a typical credit card sale, which
35 requires authorization, a sales clerk may depress a key
entitled "authorization and ticket" on keyboard 122.

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Further information concerning the format of specific data fields associated with various transactions and communications between a terminal and the host is set forth in the above-identified application serial no.
5 07/677,717.

In accordance with the invention, transactions which require immediate communication with the host computer (i.e., on-line transactions), such as
10 authorization requests, are transmitted as they occur via the network's D channel (instead of the B channel) with messages formatted according to the Q.931 standard and with the transaction data transmitted as the information element of the messages.
15

Transactions which do not require immediate communication with the host do not need to be transmitted as they occur, although they may be so transmitted. Such transactions are also preferably transmitted via the
20 network's D channel, using the information element of the messages formatted according to the Q.931 standard. Transmission of off-line transactions preferably occurs throughout the day via the information element provided by Q.931 for communication over the network's D channel. Such
25 transmission occurs whenever convenient to do so or whenever less likely to result in unnecessary B channel communication. However, at times, it may be desirable to transmit such off-line transactions to the host over the network's B channel, especially during an idle period of a
30 previously established B channel communication in which the terminal awaits acknowledgment from the host. Transmission of off-line transactions during an idle period, referred to as "piggybacking", is disclosed in the above-identified application serial number no. 07/677,717.
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Because all transaction data, whether off-line or
on-line, can be transmitted to the host over the D channel
as information elements of the messages defined in the
Q.931 standard without the need to establish a conventional
5 telephone call over the B channel, on-line transactions
made over the D channel are no longer necessarily at a cost
disadvantage vis a vis off-line transactions. Accordingly,
system overhead previously required to distinguish these
two types of transactions is no longer as critical as it
10 once may have been.

In the preferred embodiment of the invention, the
calling stations are POS terminals 114 and the called
station is host computer 112. Accordingly, the
15 conventional sequence of messages described above in
conjunction with Fig. 3 is modified such that the
information exchange between the POS terminals and the host
computer can be accomplished without establishing a
connection over the B channel.
20

In this regard, Fig. 5 depicts the sequence of
messages, formatted in accordance with the Q.931 standard,
transmitted by the communicating entities over the D
channel. The messages issued and received by the POS
25 terminals are depicted on the left-hand side of Fig. 5 as
180; the messages issued and received by the host are
depicted on the right-hand side of Fig. 5 as 182. The
messages generated by the SS7 network are depicted in the
center of Fig. 5 as 184.
30

It should be noted that "set-up", "alerting" and
"disconnect" messages symbolically depicted in Fig. 5
contain the "user-user information element" defined in
Q.931 and discussed in conjunction with, inter alia, Fig.
35 2. Accordingly, any applications running at the calling
and called stations can exchange informati n over this

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element, without affecting the signalling data provided in
the other fields of the messages defined in Q.931 for call
routing and control.

5   According to the communications scheme of the
present invention, the POS terminal sends the "set-up"
message, which contains the transaction data, to the host
computer. Such transaction data is contained in the
"user-user information element", and may be encoded using
10 techniques known to those skilled in the art. For example,
the "user-user information element" of the "set-up" message
may contain an authorization request and/or data relating
thereto. The nature of information transmitted between the
POS terminals and the host is discussed in detail above and
15 does not need to be repeated here. Similarly, the nature
of the transmission, including the structure of the set-up,
IAM, alerting and address complete messages, has been
discussed in conjunction with Fig. 3 and does not need to
be repeated here.
20

           The host issues an "alerting" message in response
to the "set-up" message. Illustratively, the data encoded
in the "user-user information element" associated with the
"alerting" message indicates to the requesting terminal
25 that the request has been received and is being processed.
After the host has completed processing of the
authorization request, the "disconnect" message is sent to
the calling POS terminal (instead of the "connect" message
discussed in conjunction with Fig. 3 that would have been
30 sent conventionally). The "user-user information element"
of the "disconnect" message contains the response to the
authorization request sent by the terminal in the "connect"
message. For example, the "user-user information element"
of the disconnect message may contain an approval or denial
35 of the authorization request and/or an authorization code
determined by the host in response to the authorization

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request. Alternatively, such non-conventional data (i.e.,
authorization code, approval, denial, etc.) may be sent in
the "user-user information element" within the "alerting"
message.

5

In response to the disconnect message, the network
initiates the release of the resources reserved by the
transaction. Accordingly, during the transaction
symbolically depicted in Fig. 5, the voice connection over
10 the B channel has never been and does not need to be
established. The advantages of exchanging information
without utilizing network resources reserved for B channel
voice communication are explained in detail above. As
indicated, this mode of communication will benefit the
15 processing of both on-line and off-line transactions.

The present invention will now be described in the
context of an illustrative software implementation in which
an authorization request transaction is processed. It will
20 be appreciated that the present invention is suitable for
use with other transactions and is adaptable for use with a
variety of other applications and communication systems.
It will also be appreciated that a variety of software
implementations of the present invention are feasible.

25

In general, an application-oriented protocol is
used to coordinate the activities between the remote
terminals and the host and to ensure common syntax and
semantics for the transmitted application data. For
30 example, the application-oriented protocol may specify a
particular type of encoding for an authorization request,
consumer or card identification data (such as account
number and expiration data), encoding of a response (i.e.,
allow or deny) to an authorization request, etc., as well
35 as the organization of such information within a message.
The application-oriented protocol uses network services to

transmit data between the nodes of the ISDN network. As
indicated, in this embodiment the network services are
accessed using the messages formatted according to the
Q.931 communication protocol standard (except for the
5   "user-user information elements" of the Q.931 messages
which do not affect data communication over the network).
The data formatted according to the application-oriented
protocol is transmitted via the "user-user information
elements" of the Q.931 messages and is transparent to the
10 network.

          The terminal software comprises suitable operating
software such as an application program, routines for
accessing ISDN, creating message packets, sending message
15 packets to the host, receiving message packets from the
host, receiving data from the magnetic strip reader, and
displaying data to a user.

          More specifically, when the magnetic strip of a
20 card is passed through the card reader device, information
stored on the strip is read and transmitted to an input
memory buffer in the terminal. A "terminal application
program" repeatedly calls a "card reader" routine to
determine if the card data is resident in the input buffer.
25 If there is such card data in the input buffer, the
terminal application program calls a "read card data"
routine which reads the data. This routine calls lower
level routines which retrieve the card data from the input
buffer and then provide the data to the terminal
30 application program.

          Thereafter, the terminal application program
formats an authorization request message string according
to the application-oriented protocol. The message string
35 comprises, for example, an encoding of an authorization
request and the data read from the magnetic strip of the

card. Then, the application program calls an "initiate
session" routine that takes the terminal "off-hook" and
sends the "set-up" Q.931 message over the D channel to the
host. To create a message to the host, an "initiate

5 session" routine calls a "create packet" routine and sends
the message string formatted according to the application-
oriented protocol to the create packet routine. The create
packet routine then creates a "message packet" formatted
according to the Q.931 protocol. As indicated, the Q.931

10 messages employed in this embodiment generally comprise the
application-oriented message string in the "user-user
information element" of the message as well as other data
required for network communication. The message packet,
suitably formatted by the create packet routine, is then

15 sent by a "send message" routine over the D channel to the
host. The send message routine calls lower level routines
that perform the functions of MTP levels one and two, such
as interfacing with the hardware to send the message packet
over the D-channel.

20

       To receive messages from the host, such as the
"alerting" and "disconnect" Q.931 messages described in
conjunction with Figs. 3 and 5, the terminal application
program calls a "receive message" routine. The receive

25 message routine first calls a lower level routine to
determine whether a message is waiting in a communications
memory buffer. If a message is waiting in the
communications buffer, the receive message routine calls a
"retrieve" routine to retrieve the message from the buffer

30 and then calls a parse routine to parse the message packet.
All network communications protocol information is removed
from the packet leaving only a message string transmitted
via the "user-user information element" of the Q.931
packet. The receive message routine then returns this

35 message string to the terminal application program.

When authorization related information is received
from the host as a message string in the "user-user
information element" of the disconnect message, the
terminal application program calls a "display message"
5 routine to facilitate the display of the received
authorization information to a user. The display message
routine calls lower level screen driver routines to display
this information.

10   The host software comprises an applications
program and associated routines for formatting message
packets, sending message packets to a terminal, receiving
message packets from a terminal, and interfacing with
databases. The routines that format the Q.931 message
15 packets, send message packets, and receive message packets
are similar to the corresponding terminal software routines
and call similar lower level routines to aid in performing
these functions. As indicated previously, when the host
receives card data from the terminal in the "user-user
20 information element" of the "set-up" message, the host
formats and transmits the "alerting" message to the
terminal. Subsequently, the disconnect message is
formatted and sent to the terminal. Advantageously, an
authorization response is sent to the terminal as part of
25 the "user-user information element" of the disconnect
message.

         To determine the authorization response to be
included in the disconnect message, the "host application
30 program" calls several database routines. When the host
computer receives card data from the terminal, an
"authorization request" routine is called by the host
application program. The authorization request routine
calls a format routine to format a database request
35 corresponding to the transmitted card data and then calls a
"send request" routine to request the card authorization

information, i.e., whether or not to authorize the transaction, from the database. The send request routine returns the database information for a given card to the "authorization request" routine. The authorization request
5 routine then calls a "format response" routine to parse such information and determine the appropriate response to send to the host application program for transmission to the terminal. In addition to calling such database routines, the authorization request routine also calls
10 database modification routines to record information relating to authorization requests and the like in the database.

By virtue of the foregoing there is thus provided
15 a method and apparatus for transmitting data in a digital telecommunications network in which such data, to the extent desired or possible, is transmitted over a signalling channel such as a D channel of an ISDN. Advantageously, such a system reduces the load on
20 conventional ISDN voice and data channels, such as B channels, and potentially enables data transmission to occur at a lower cost.

While the present invention has been illustrated
25 by description of an embodiment and while the illustrative embodiment has been described in considerable detail, it is not the intention of the applicant to restrict or in any way limit the scope of the appended claims to such detail. Additional advantages and modifications will readily appear
30 to those skilled in the art. The invention in its broader aspects is therefore not limited to the specific details, representative apparatus and method, and illustrative example shown and described. For example, the invention is not limited to use in POS syst ms or to any specific type
35 of communication or transaction. Rather, the method and apparatus disclosed and claimed herein may be used in any

suitable telecommunications network, such as a network of
automatic teller machines (ATMs) connected to an ISDN.
Additionally, while the present invention has been
described in the context of communications between the
5 remote terminal(s) and the host of an ETC system, it is
also applicable to communications between the host and the
various databases and the like. Accordingly, departures
may be made from such details without departing from the
spirit or scope of applicant's general inventive concept.

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We claim:

1. A method of exchanging information between a
host computer and at least one remote terminal comprising
5 the steps of:
sending a first message from said one remote
terminal to said host computer over a signalling channel of
an ISDN network, said first message containing data
representing an information element which contains encoded
10 information to be communicated to an application running on
the host computer;
sending a second message from said host computer
over said signalling channel of the network to said one
terminal, said second message being responsive to said
15 first message; and
sending a third message from said host computer
over said signalling channel of the network to said one
terminal, said third message being responsive to said first
message and including a disconnect message;
20   · wherein the exchange of messages between said host
computer and said one terminal is accomplished without
establishing communication over any non-signalling channel
provided by the ISDN network.

25   2. The method of claim 1 further comprising the
step of processing said information element communicated to
said host, said step of processing including the step of
interacting with at least one database accessible by said
host to determine whether a transaction is to be
30 authorized.

3. The method of claim 2 wherein said first and
second messages correspond respectively to "set-up" and
"alerting" messages in accordance with the Q.931 standard.
35

4. The method of claim 1 wherein the information element is encoded as the contents of a user-user information element in accordance with the Q.931 standard.

5. The method of claim 1 wherein each remote terminal is a point-of-sale terminal for performing a variety of consumer transactions.

6. The method of claim 1 wherein an authorization request is encoded as the contents of said information element of said first message and an authorization code determined by the host is encoded as the information element of the third message.

7. The method of claim 1 wherein an authorization request is encoded as the contents of said information element of said first message and an authorization approval or denial determined by the host is encoded as the information element of the third message.

8. The method of claim 1 wherein an authorization request is encoded as the contents of said information element of said first message and authorization information is encoded as the information element of the second message.

9. A transaction processing system comprising:
a host computer system including means for retrieving transaction data from information transmitted to said host;
a plurality of remote terminals, each of said terminals having means for generating a message to be communicated to said host computer and means for interpreting a message received from said host computer, said message communicated to said host including said transaction data; and

a network for enabling communication between said host computer and said terminals, said network providing each of said terminals with a plurality of multiplexed communication channels, at least one of which channels is a
5 signalling channel;

wherein each of said terminals includes means to exchange information with said computer by sending and receiving messages over said signalling channel of said network without utilizing other channels of said network,
10 each of said messages including a first portion for data required for network communication by an appropriate protocol and a second portion for data representing the information that is exchanged between said host computer and said terminal.
15

10.   The system of claim 9 wherein said network is an ISDN network.

11.   The system of claim 10 wherein said
20 signalling channel is a D channel provided by said ISDN network.

12.   The system of claim 11 wherein said messages to be communicated to said host computer and said messages
25 received from said host computer are formatted according to the Q.931 standard.

13.   The system of claim 12 wherein said messages to be communicated to said host computer and said messages
30 received from said host computer are transmitted over said ISDN network as part of a user-user information element formatted according to the Q.931 standard.

35

14. The system of claim 13 wherein the exchange of information between the host computer and each of the terminals is accomplished solely over said D channel of the ISDN network.

5

15. The system of claim 14 wherein each of said terminals is a point-of-sale (POS) terminal for performing a variety of consumer transactions such as sales, returns, authorizations, deposit inquiries, and voiding of a

10 previously entered transaction.

16. The system of claim 15 wherein each of said POS terminals comprises at least one computer unit, associated peripherals, and interfaces to the network.

15

17. The system of claim 16 wherein said peripherals comprise a transaction data input device for entering transaction data to be communicated to the host computer over the network.

20

18. The system of claim 17 wherein the peripherals further comprise a consumer input device for entering data specific to a given consumer.

25   19. The system of claim 18 wherein the consumer input device is a card reader adapted to read encodings provided on a plastic card.

20. A method for transmitting a request related

30 to a consumer transaction from a merchant to a host computer and for processing the request comprising the steps of:

providing a terminal connected to the host via an ISDN network having at least one signalling channel;

35

inputting consumer data including account information identifying a consumer's account into a memory of the terminal;

5   encoding an application message string, which includes the consumer data and the request, in accordance with an application-oriented protocol, such that the message string can be interpreted by software running on the host;

           formatting a communication message according to a
10 communications protocol, which communication message includes the application message string and data for controlling message transmission across the ISDN network from the terminal to the host; and

           transmitting the communication message over the
15 signalling channel of the ISDN network.

           21.   The method of claim 20 wherein the signalling channel is a D channel.

20   22.   The method of claim 21 wherein the communication message is formatted according to the Q.931 standard.

           23.   The method of claim 22 wherein the
25 application message string is transmitted as a user-user information element.

           24.   Apparatus for transmitting a request related to a consumer transaction from a merchant to a host
30 computer and for processing the request comprising:

           a terminal connected to the host via an ISDN network having at least one signalling channel;

           means for inputting consumer data including account information identifying a consumer's account into a
35 memory of the terminal;

means for encoding an application message string,
which includes the consumer data and the request, in
accordance with an application-oriented protocol, such that
the message string can be interpreted by software running
5 on the host;
                means for formatting a communication message
according to a communications protocol, which communication
message includes the application message string and
consumer data for controlling message transmission across
10 the ISDN network from the terminal to the host; and
                means for transmitting the communication message
over the signalling channel of the ISDN network.

                25.   The apparatus of claim 24 wherein the
15 signalling channel is a D channel.

                26.   The apparatus of claim 25 wherein the
communication message is formatted according to the Q.931
standard.
20
                27.   The apparatus of claim 26 wherein the
application message string is transmitted as a user-user
information element.

25   28.   In a host computer, having access to at least
one database and being connected to a terminal via an ISDN
network, a method of processing a consumer transaction
request comprising the steps of:
                receiving a request message from a signalling
30 channel of the ISDN network, which message includes an
application message string formatted according to an
application-oriented protocol, and other data for
controlling message transmission across the ISDN network;
                parsing the request message so as to separate the
35 application message string from the other data in the
request message.

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interpreting the message string in accordance with the application-oriented protocol so as to identify and process consumer data including consumer account information;

5   retrieving information related to the consumer from the database;

generating a response message on the basis of the retrieved information; and

sending a response communication message over the
10 signalling channel of the ISDN network.

29.   The method of claim 28 wherein the signalling channel is a D channel.

15   30. The method of claim 29 wherein the request message and response communication message are formatted in accordance with the Q.931 standard.

31.   The method of claim 30 wherein the request
20 communication message is a Q.931 set-up message and the response message is a Q.931 disconnect message.

32.   Apparatus for processing a consumer transaction request comprising:

25   a host computer;

a remote terminal, said host computer and said terminal each being capable of two-way communication with each other via an ISDN network;

at least one database accessible by said host;

30   means for receiving a request message from a signalling channel of the ISDN network, which message includes an application message string formatted according to an application-oriented protocol, and other data for controlling message transmission across the ISDN network;

35

means for parsing the request message so as to separate the application message string from the other data included in the request message;

means for interpreting the message string in
5 accordance with the application-oriented protocol so as to identify and process consumer data including consumer account information;

means for retrieving information related to the consumer from the database;

10   means for generating a response message on the basis of the retrieved information; and

means for sending a response communication message over the signalling channel of the ISDN network.

15   33.   The apparatus of claim 32 wherein the signalling channel is a D channel.

34.   The apparatus of claim 33 wherein the request message and response communication message are formatted in
20 accordance with the Q.931 standard.

35.   The apparatus of claim 34 wherein the request communication message is a Q.931 set-up message and the response message is a Q.931 disconnect message.
25

36.   Apparatus for communicating a request related to a consumer transaction comprising:

a first terminal including means for transmitting the request over a signalling channel of an ISDN network
30 having at least one signalling channel;

a second terminal including means for receiving the request from said first terminal via the signalling channel; and

35

a database accessible by said second terminal, said database providing information to said second terminal which enables said second terminal to approve or deny the request,

5   said second terminal including means for transmitting the request approval or request denial to said first terminal.

37. The apparatus of claim 36 wherein the
10 signalling channel is a D channel and the request as well as the request approval or request denial are formatted in compliance with the Q.931 standard.
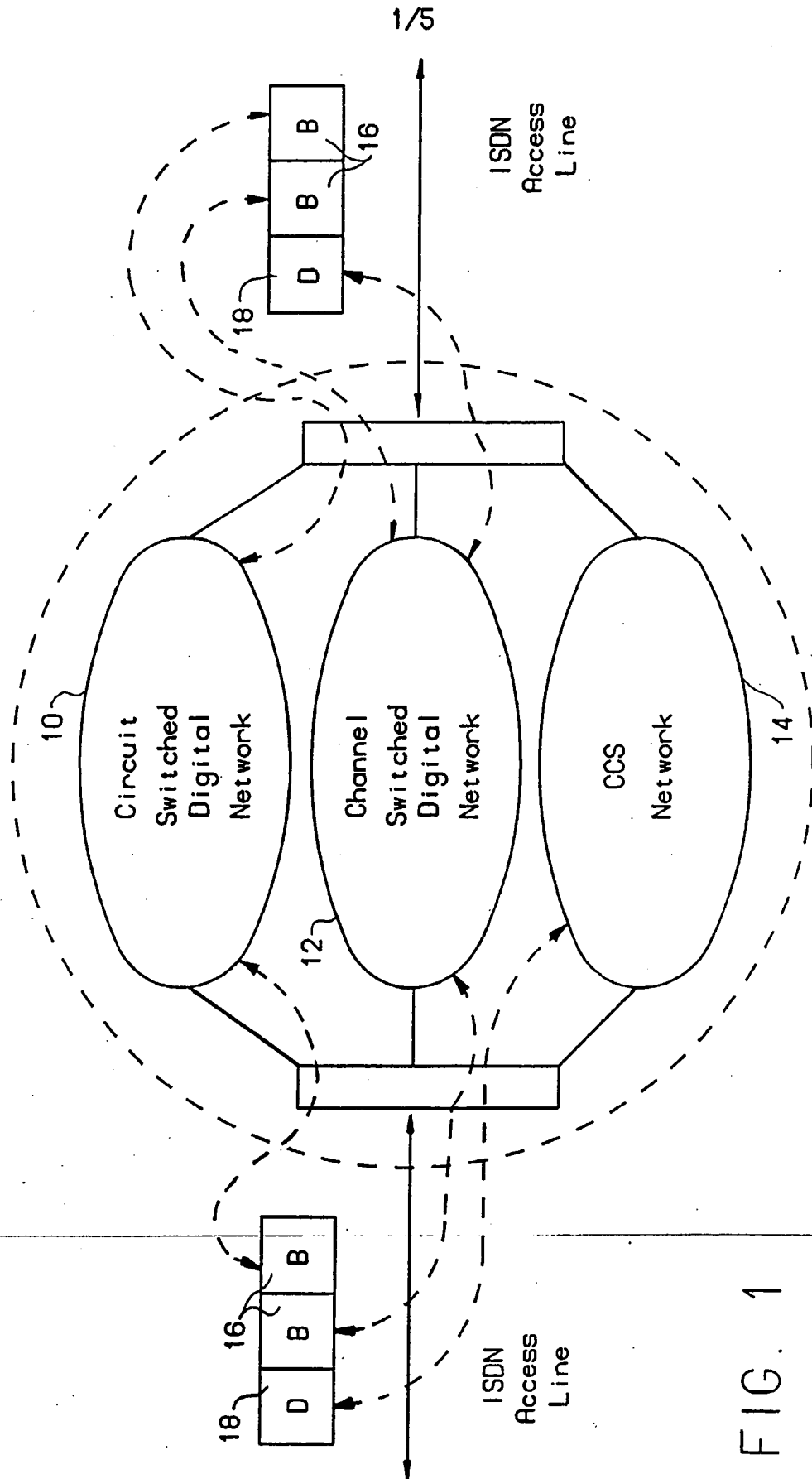
15

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35
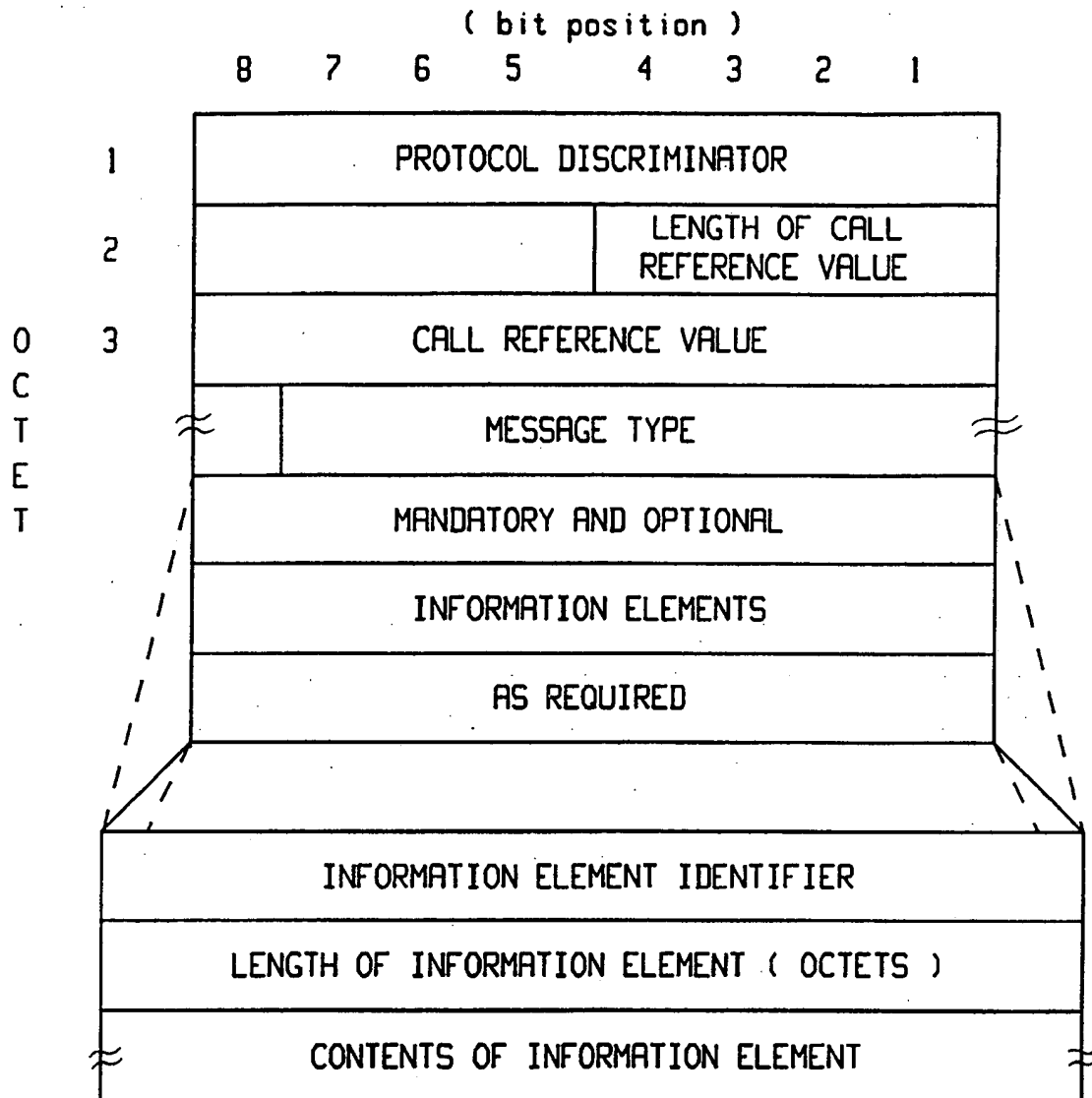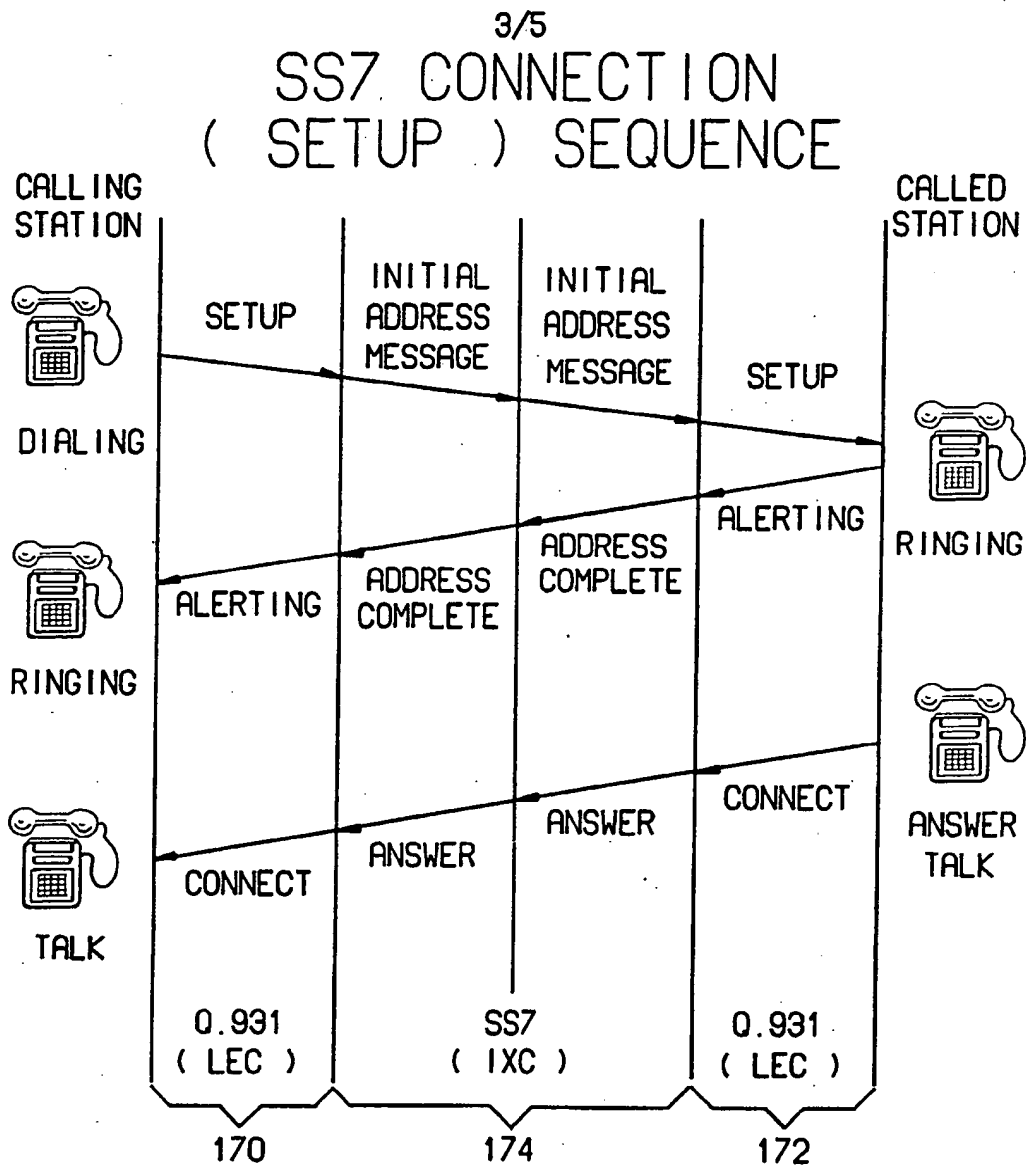
FIG. 1

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LAYER 3 (Q.931)
MESSAGE STRUCTURE

(bit position)

8   7   6   5   4   3   2   1

1	PROTOCOL DISCRIMINATOR
2		LENGTH OF CALL REFERENCE VALUE
3	CALL REFERENCE VALUE
	MESSAGE TYPE
	MANDATORY AND OPTIONAL
	INFORMATION ELEMENTS
	AS REQUIRED

O
C
T
E
T

| INFORMATION ELEMENT IDENTIFIER |
| LENGTH OF INFORMATION ELEMENT (OCTETS) |
| CONTENTS OF INFORMATION ELEMENT |

FIG. 2

SS7 CONNECTION
(SETUP) SEQUENCE

FIG. 3
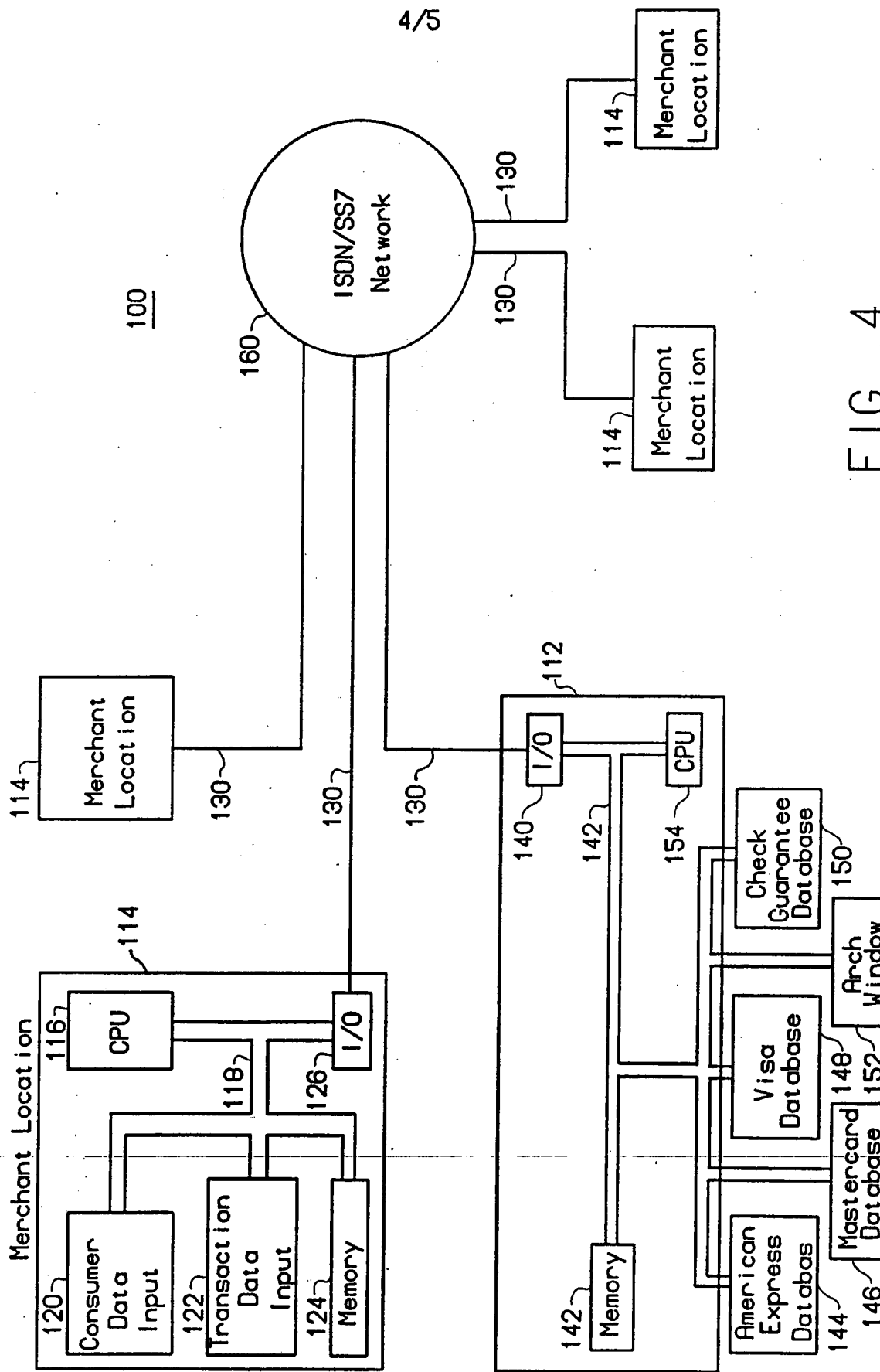
FIG. 4

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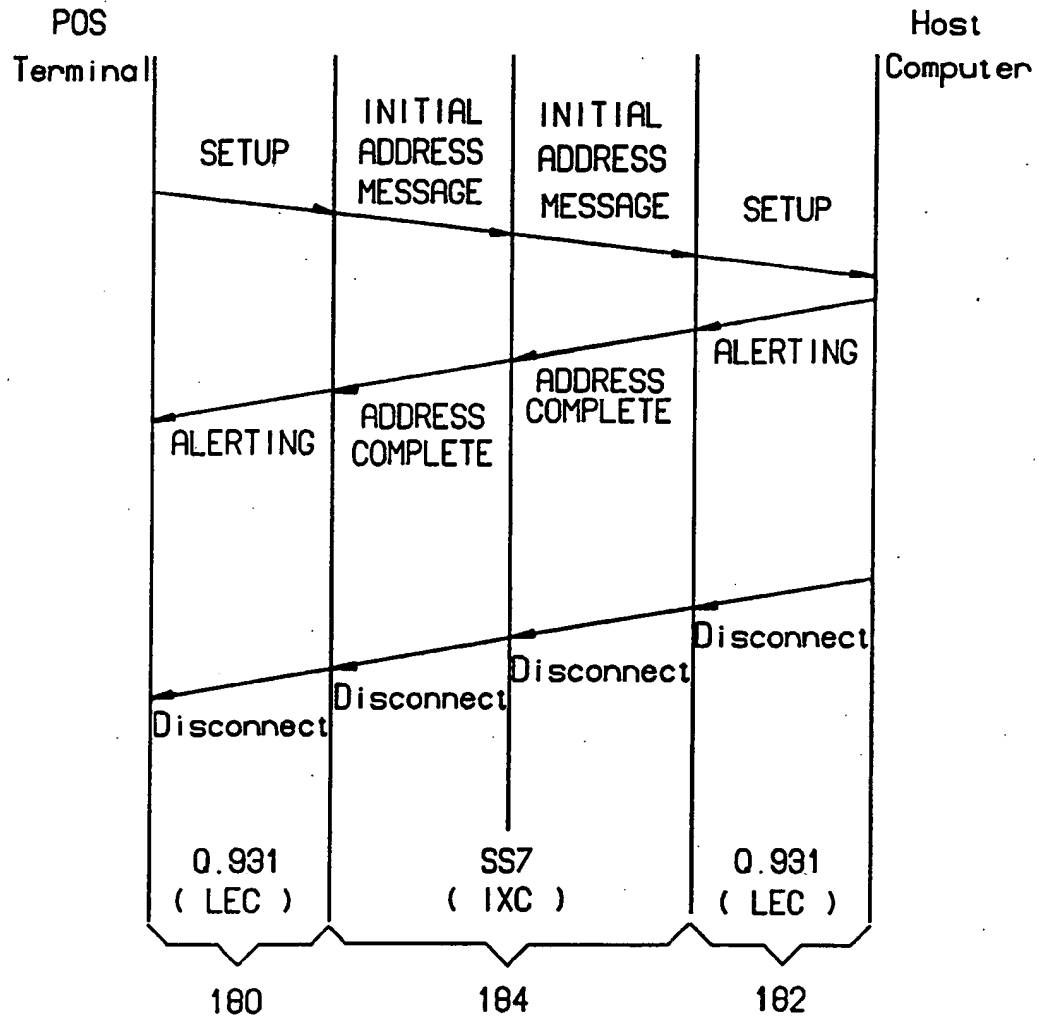
FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US92/06706

A. CLASSIFICATION OF SUBJECT MATTER

IPC(5) :G06F 15/21; H04M 3/22; H04J 3/26
US CL :379/91; 370/110; 364/401; 235/380; 395/325
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. :

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

APS database Search: ISDN, D, 931,
User(1w) user, point (1w) sale#, POS,
authoriz?, communication#, credit, database

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P	US, A, 5,043,983 (DORST ET AL.) 27 August 1991, See figs. 1,3 and 8; entire text.	1-4,9-14, 28-35
Y	US, A, 4,317,957 (SENDROW) 02 March 1982, See figs. 1 and 2; col. 4, line 57; cols. 6 and 7.	5-8,15-27, 36,37
Y	US, A, 4,999,836 (FUJIWARA) 12 March 1991, See entire text.	1-4,9-14, 28-35
Y	US, A, 4,654,482 (DeANGELIS) 31 March 1987, See entire text.	5-8,15-27, 36,37
Y	US, A, 4,755,992 (ALBAL) 05 July 1988, See entire text.	1-4,9-14, 28-35
Y	US, A, 4,891,503 (JEWELL) 02 January 1990, See entire text.	5-8,15-27, 36,37

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be part of particular relevance		
"E"	earlier document published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed	"&"	document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
05 OCTOBER 1992	1 8 NOV 1992

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